

## ABSTRACT

The construction of a stock portfolio in investment aims to reduce risk by diversifying funds across multiple stocks. This study applies the Median Variance method with Particle Swarm Optimization (PSO) to construct an optimal stock portfolio based on investor's utility function, which represents investor satisfaction with the combination of portfolio risk and return. Median Variance is a more reliable portfolio construction method in volatile market conditions as it does not rely on the assumption of return normality, while PSO efficiently determines the optimal portfolio weights without requiring function derivatives, making it suitable for complex investment problems. Portfolio risk is measured using Value at Risk (VaR) and Expected Shortfall (ES) through historical simulation. ES is used to assess potential losses beyond VaR, providing a more comprehensive view of extreme risks that may happen. This study uses daily closing price data from eight stocks representing each sector in IDX Sharia Growth from January 2, 2023, to January 31, 2025. The optimal portfolio is determined based on the fitness value, which measures how well a portfolio maximizes the investor's utility function. A lower fitness value indicates a more optimal portfolio. The optimization results produce an optimal portfolio with a fitness value of 0,001749. The optimal portfolio consists of five selected stock with the following fund allocation: 26,64% in PT Bank Syariah Indonesia Tbk (BRIS), 26,55% in PT Dharma Satya Nusantara (DSNG), 24,31% in PT Map Aktif Adiperkasa Tbk (MAPA), 14,34% in PT Siloam International Hospitals Tbk (SILO), and 8,16% in PT Surya Semesta Internusa Tbk (SSIA). A portfolio investment of Rp100.000.000,00 results in a Value at Risk (VaR) of Rp9.233.498,00 and Expected Shortfall (ES) of Rp14.773.673,00 at a 95% confidence level and a one-month holding period (21 trading days).

**Keywords:** Median Variance, Particle Swarm Optimization, Value at Risk, Expected Shortfall